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THE ECONOMIC FEASIBILITY OF A CENTRALIZED STORES OPERATION FOR STATE AGENCIES

PHASE III – PROJECT REPORT

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EXECUTIVE SUMMARY

This report summarizes the economic feasibility of a central stores operation for State government. It was initiated at the request of the Director of the Department of Administration to determine the best method of supplying the State with office supplies. The scope included the design of a central stores and the determination of the categories of office products which the stores would carry. Once a central stores was designed, its costs of operation and its services were compared to two other operations: a supply operation consisting of only term contracts, and a supply operation similar to that which is presently in operation. This comparison was done in a partial budget format.

The stores designed for this study carried small office supplies (i.e. pens, tape, tablets, etc), fine paper (typing paper, duplicating paper, envelopes, etc.), and computer paper. Office furniture was also examined, but a term contract for that category appeared less costly at this time. Other aspects of the proposed stores include computerized accounting and inventory management, 3.25 FTE positions, a 10,000 square foot warehouse, and weekly ordering and delivery with emergency deliveries twice a day. The direct costs of this operation are projected at $95,100 per year. Sales in the neighborhood of $600,000 are expected annually. A markup of 16% should cover expenses.

As mentioned above the costs of the proposed stores was compared with two other options: term contracts only and a continuation of the present system. The major difference between term contracts and the proposed stores was monetary -- the stores showed an annual savings of $150,000. When compared to the other option, continuation of the present system, the differences were significant in three areas: service; workloads at the agency level; as well as cost ($13,000 per year). In fact, the current operation has caused so much concern that prior to this study a determination had already been made to return to term contracts. A central stores, such as the one outlined in this study, has the potential of substantially reducing cost and improving service to the State while eliminating the problems associated with the current operation.

INTRODUCTION

This report examines the economics of establishing a warehousing and distribution (central stores) operation for office products, serving State agencies based in the Helena area. Items examined include office supplies, office furniture, and paper products used in the office. Comparisons between the various methods available for handling office products are also provided.

BACKGROUND

Office products used in State government are categorized into different groups by the Purchasing Division. Each group is purchased and stored in a different manner. Small office supplies, including pens, tape, tablets, etc., are purchased through a quarterly bid and stored by the ordering agency. Fine paper includes typing, duplicating and other blank paper. It is purchased through the bid process, semi-annually, and stored by the ordering agency. Computer paper is purchased on an annual term contract and stored in multiple locations. Office furniture is purchased through an annual term contract (no storage is needed).

Each group considered in this study has different characteristics which affect their adaptability relative to a central stores operation. Therefore, each is examined separately with the central stores operation designed only for those groups which appeared monetarily and technically attractive.

Small Office Supplies

For the previous ten years the State has obtained its office supplies through a term contract. It allowed State agencies to buy items listed in a specific office supply catalog at a set percentage discount from the listed price. The company who had the term contract for office supplies traveled to State offices in Helena taking orders and delivering on a weekly basis. The contracts for the past years are listed on the following page.

Table 1 - TERM CONTRACTS FOR SMALL OFFICE SUPPLIES

Fiscal Year	Discounts	Vendor	# of Vendors Bidding
1978-1979	46%	Warden Paper	2
1977-1978	38%	Warden Paper*	**
1976-1977	38%	Leslie Paper	**
1975-1976	38%	Leslie Paper	5
1974-1975	34%	Mailing Shop	**
1973-1974	34%	Mailing Shop	4
1972-1973	32%	Mailing Shop	5
1971-1972	32%	Mailing Shop	4
1970-1971	31%	Mailing Shop	5
1969-1970	Per Item Bid	?	3
1968-1969	Per Item Bid	Tribune Office Supplies	2
-1968	No Records		

*Leslie Paper sold its Great Falls branch to Warden Paper in FY 1977.
**The Purchasing Division exercised it's option to extend a contract for up to 3 years.

A brief look at the discounts in Table 1 shows a range of 31% to 46%. The table also shows that from 1970 until 1975 The Mailing Shop had the contract. From 1975 to 1979 Warden Paper had the contract. These periods of tenure were caused by underlying actions within the industry. Prior to 1975, no wholesaler[1] bid on the term contract and The Mailing Shop managed to stay slightly above its latest competitors who frequently bid 30 to 31%. Starting in 1975, Leslie Paper (later to become Warden Paper) entered the bid competition. Since most of the bidders were retailers serviced by Warden Paper, they dropped out of the competition. The only other bidder for the 1978-1979 contract was The Mailing Shop, who bid 32%. Recently Warden Paper has indicated that they will no longer bid on a state term contract. They will only sell to recognized retailers.

In estimating an expected discount under a term contract, only the low bids from retailers were considered. For the years 1975-1979, the low bid was consistantly 32%, ignoring the wholesale bid. Based on the median historical bid, a term contract discount of 32% is anticipated.

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[1] Only two office supply wholesalers now operate in Montana: Warden Paper and Reporter Printing. Reporter Printing does not bid on the office supply contract.

Beginning with this fiscal year (July, 1979) the Purchasing Division switched from term contracts to quarterly buys. Table 2 provides comparative information relative to prices under term contracts versus quarterly buys and the associated savings.

Table 2 - COMPARISON OF TERM CONTRACTS VERSUS QUARTERLY BUYS

DESCRIPTION	LIST PRICE[1]	32% - TERM CONTRACT PRICE[2]	QUARTERLY BUY PRICE[3]	SAVINGS[4]
1st Quarterly Buy	$235,236	$159,960	$108,817	$ 51,143
2nd Quarterly Buy	169,581	115,315	90,433	24,882
1st + 2nd Total	$404,817	$275,275	$199,250	$ 76,025
Annualized (X 2)	$809,634	$550,550	$398,500	$152,050

Footnotes:

1. List (or catalog) price for supplies.
2. Term contract price with a 32% discount.
3. Bid price under quarterly buy.
4. Estimated savings of quarterly buy over 32% term contract.

While this price savings is attractive, the quarterly bid is not without its drawbacks. The first call for bids was sent out April 27, 1979, and opened June 1, 1979. It took until August 1979 to compile and notify vendors. Orders were received in October, six months after the process began. Because of the time delay, agencies had to either accurately forecast their needs for periods six to nine months in advance, purchase excess supplies, or purchase items they ran short of from local vendors. So far, many agencies have forecast their usage of some items inaccurately. On some items they have over a years supply. On others they have run out. What one agency has in excess, another agency may require. Also, many items are being purchased from local vendors at substantially higher costs.

In addition to the above problems, outright mistakes in filling out orders have occurred. For example, one agency thought they were ordering ash trays by the unit, but it was by the gross. The vendor would not take them back, leaving the

agency with an excess of almost six gross of ash trays. While errors of this magnitude were few, numerous smaller mistakes have occurred.

Along with the move away from term contracts for office supplies, the State has tried other changes. These include standardization of office supplies and the establishment of a pilot central stores for smaller State offices in Helena. The standardization of small office supplies decreased the number of items available to agencies from the thousands to about 600.

Pilot Stores

In mid 1979, a pilot stores, operated by the Department of Revenue, was initiated as a test of central warehousing. ISD's Phase II report issued October, 1979 analyzed this operation and reported it beneficial to the State. After the issuance of that report the pilot stores estimated an increase in expenses and sent bills to the various user agencies. The agencies, in general, reacted unfavorably to these additional charges.

A cursory review indicated a variety of problems which caused the negative reaction. These problems relate to: cost estimating techniques, assignment of these costs to the user agencies, and inventory management, as well as communication problems and general misunderstanding. However, after reviewing the pilot stores operation in detail, the concept of a central stores still appears beneficial to the State.

Fine Paper

The fine paper category includes most sheet paper, envelopes, etc., but excludes tablet paper and computer paper. For over ten years, fine paper has been obtained through a semi-annual call. This bid is run similar to the office supply quarterly call, except the number and diversity of items is much smaller. Agencies fill out a standardized order form, then the Purchasing Division consolidates the orders and sends them out for bid. Vendors are required to deliver to each agency and, on occasion, a vendor may only receive the contract for one item for only one of the many agencies ordering it. Since vendors know this, they occa-

sionally only bid on the larger orders. When they do bid on small orders, the per unit price is generally higher. For the last couple of years the Reproduction and Distribution Bureau of the Department of Administration has acted, to some degree, as a central stores for duplicating paper and other duplicating materials. Thus, the smaller users are able to skip the work involved in ordering and warehousing their paper, and delivery of small quantities at a lower price is insured.

As with the other commodities, the optimal level of paper ordered depends on economic factors such as the cost of ordering, storage, usage, price, quantity discount, salaries, and the interest revenue lost on the inventory value. In addition, the paper industry is subject to non-monetary or technical factors which affect availability. These technical factors cause papers availability to be cyclical, both on an item by item basis and overall. For example, during the last semi-annual call only two vendors bid on the order and these vendors bid on only a few items. Many agencies were left on their own to acquire their other necessary paper items. Even more recently, a shortage in yellow paper resulted in vendors being unable to fill the States order for "yellow writing pads".

Precise estimates of annual usage of fine paper items are quite difficult to obtain. Records which would provide us with total dollar value of purchases by item are not kept. In addition, the quantity of yearly purchases of items varies dramatically and data over only two years is not enough to provide much confidence in a mean (average) value. To illustrate the problem, Table 3 lists five types of paper and the amounts purchased in 1978 and 1979. While this listing of extreme examples is not complete, it contains 80% of the total number of cartons purchased in the semi-annual fine paper calls during the period. Obviously, any forecast of annual usage based on this data will be subject to extreme variation.

Table 3 - SELECTED FINE PAPER PURCHASES BY HELENA-BASED AGENCIES, 1978-1979

Type (all letter size)	Purchase Quantity (cartons) 1978	1979
Bond, White, 20 lb., 25% cotton	41	118
#1 Sulfite, White, 20 lb.	8	335
#4 Sulfite, White, 20 lb.	85	265
Duplicator, 20 lb.	200	325
Bond, Xerography-copier, 20 lb.	3,420	52

Estimating the average price for each type of paper was also difficult. On any given call, an item is bid on an agency basis. Agencies with equal quantity orders frequently received different prices for the same item. Sometimes agencies with large orders paid higher prices per item than agencies with smaller orders. Again, the variability of the mean price estimate is increased.

Over the past two years, Helena-based agencies have purchased an average of $73,000 of fine paper per year. For the above mentioned reasons, this value is used cautiously in the analysis. In addition, there have been no term contracts which would have provided the necessary comparison data. As a result of limited data in combination with the technical factors mentioned above, the use of economic formulas to determine order parameters for fine paper products is not feasible at this time. For the analysis, it is assumed that the present semi-annual call will be continued along with a large safety stock. If a central stores becomes operational, the information needed to examine fine paper in more detail will become available.

Computer Paper

In contrast to the almost universal demand for most paper products throughout State agencies, computer paper has a more exclusive demand. One agency, the Computer Services Division (CSD) of the Department of Administration uses about 75% of the State's total demand for computer paper (or about 90% of the demand by Helena based State agencies). Since their usage is so high, a warehousing function for compter paper developed within CSD. The computer paper is purchased through a term contract, but vendors who bid the contract know that the vast majority of the paper will be delivered to one location in Helena.

The supply of computer paper has historically been more stable than the supply of fine paper products. However, ready substitutes for computer paper are not available. Because of this, a shortage of computer paper would be more disastrous than a shortage of other paper products which have substitutes. As a preventative measure, CSD has attempted to build and maintain a one-year inventory of continuous computer paper. CSD's own annual usage amounts to 6,000 cases. In total, the State uses about 8,000 cases each year at a current term contract cost of almost $175,000.

As previously mentioned, computer paper is purchased on a term contract. However, in 1977 a large purchase equivalent to about one years usage of computer paper was made in addition to the term contract. This large purchase provided the information necessary to compare the annual term contract with an annual buy. The term contract in 1977-1978 was extended from the 1976-1977 term contract with no change in prices. The weighted average (weighted by dollar volume) price discount from this two-year term contract was 25.8%. CSD consumed $126,000 of computer paper this past year. Assuming this is 90% of the total consumption by State agencies based in Helena the total becomes $140,000. Assuming the State could get the same weighted average discount that it received in the large 1977 purchase, the cost would have been $103,880; a savings of approximately $36,100[2].

Storage for the computer paper in 5,000 square feet (ft^2) of the Old Liquor Warehouse costs $10,650 per year. The carrying costs on an average inventory value of $51,940 (half of $103,880) at 10.5% is $5,454 per year. These costs total about $16,100 annually - about $20,000 less than the savings. Since they represent a large part of the economic cost of including computer paper in a central stores, and since the savings is significant, it is concluded that computer paper should be included in the proposed central stores. The conclusion was corroborated by the CSD assistant administrator.

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[2] Actual value is $36,120 but throughout the report calculations are rounded to the nearest $100.

OFFICE FURNITURE

For several years prior to 1979, office furniture was bid in a similar fashion to the old office supply term contract. Before that, it was bought on a quarterly call. The call took too long and was expensive to administer so the term contract was initiated. Then, as a result of the Governor's recent request to standardize office equipment, the Purchasing Division began bidding out a list of 19 office furniture items (2 or 3 colors each). The low bidder on this list is given a one-year term contract. Agencies order directly from the vendor who delivers within ten days. Under the old term contracts, the bid price was a discount from a catalog price - usually 47% to 52%. However, the wide choice offered to agencies often resulted in very long back orders. The current bid price has an average discount (not a weighted average) from list of 42%.

Reporter Printing in Billings holds the present office furniture contract. Capital Office Supply in Helena had it last year, and Reporter Printing the three years previous to that. Over the last three years, purchases of office furniture have been $200,000, $200,000 and $180,000 respectively, but the Purchasing Division expects this pace to decline in the immediate future with the decrease in expansion of State offices. The Purchasing Division reported that State agencies are pleased with the service under the present contract.

The average discount for the 1979-80 contract is 42%. If $180,000 of furniture is purchased at the discount during this fiscal year (as it was in 1978-79) the list price on that furniture would be about $310,000. The Purchasing Division indicated that an annual purchase of furniture should bring a discount of 50 to 55%. This is a total expenditure of between $155,000 and $140,000 (depending on the respective discount). Using the 50% figure gives a conservative estimate of the price savings of a single purchase versus a term contract.

$180,000 - $155,000 = $25,000

However, an additional 5% increase in the discount, will increase the savings by:

5% X $310,000 = $15,500

Purchasing expenses for the annual term contract are \$6,500[3]. A single bid purchase also cost \$6,500. If the bid purchase is executed twice a year the total cost will be \$13,000 or \$6,500 more than what a term contract would cost.

Assuming \$155,000 of furniture will be acquired during the year and purchased in two calls the maximum inventory will be \$77,500 (\$155,000 ÷ 2). If an additional \$32,500 of inventory is stored as safety stock, the maximum inventory would be \$100,000 (\$77,500 + \$32,500) and would require 2700 ft^2 of warehouse storage space. Therefore, the average inventory (assuming constant agency demand) is: (\$77,500 ÷ 2) + \$32,500 = \$71,250.

The above factors are displayed in Table 4.

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[3] Based on a review of Purchasing Division costs.

Table 4 - ANNUAL PARTIAL BUDGET COMPARISON FOR OFFICE FURNITURE SEMI-ANNUAL PURCHASE/WAREHOUSING vs TERM CONTRACT

Increased Costs:		
Warehousing 2700 ft^2 @ $3.00/$ft^2$/yr		$8,100
Carrying Cost $71,500 X 10.5% = $7,481		7,500
Purchasing		6,500
Salaries		9,300
Management .125 FTE @ $24,000/yr	$3,000	
Staff .50 FTE @ $12,500/yr	6,300	
Delivery Cost		600
Truck 60 mi/week @ $.15/mi	500	
Other Machinery & Maintenance	100	
Office Equipment and Supplies		600
Contracted Services		1,000
TOTAL		$33,600
Decreased Costs		
Price Savings of Semi-annual purchase with one drop point over term contract.	$25,000 to $40,500	
Net Savings (loss)	($8,600) to $6,400	

*All Values Rounded to Nearest $100.00.

As can be seen, the partial budget is inconclusive. If the discount from an outright purchase is greater than 53%, then the warehousing operation becomes feasible. Since the discount is merely a guestimate within several percentage points of the break-even value, the partial budget does not provide a clear conclusion.

Besides the expenses listed under "increased costs" there is one expense which could not be quantified. This is the risk premium. If the demand for furniture changes or drops, the warehouse would experience the increased cost of being overstocked, i.e., under the present contract, the vendor takes the risk.

Since the partial budget comparison was inconclusive and the agencies are evidently content with the term contract, if follows that office furniture should be left on the term contract (with the vendor taking the risks). If a central stores is established, office furniture can be reconsidered as part of the merchandise carried.

OPTIMAL CENTRAL STORES

The purpose of this study is to determine whether a central State stores can provide better service at a lower price than the other supply and warehousing options open to the State. A key factor then, is the size and operating characteristics of the store as those characteristics will directly affect the cost of the operation. An "optimal central stores" was developed for small office supplies, fine paper and computer paper using monetary criteria (quantity discounts, ordering costs, delivery costs, inventory carrying costs, and technical constraints).

The analysis which follows subdivides the proposed central stores into cost areas to facilitate estimation of values. These areas are:

Salaries
Warehousing
Carrying Costs
Inventory Control System
Purchasing
Distribution

SALARIES

In determining the staffing requirements of a central stores an analysis was made of the present staffing of the Department of Revenue's pilot store, and additional data compiled from other departmental stores. The pilot store now uses about 2.50 FTE employees to supply office products at the rate of $150,000 per year. However, their operation offers daily service and deals mainly with smaller offices. By switching to weekly service and a computerized inventory, enough time should be made available to handle the larger volume. This contention is supported by the fact that the Department of Highways office supply stores handles an annual volume of $84,000 with a staff of 0.50 FTE. Their service is limited and their inventory is tabulated by a computer. Given this information an optimal central stores should be able to operate with a staff of three employees. A supervisor (Grade 12) would be in charge of the operation, and have decision-

making authority on daily facets of the operation. The other two staff employees (Grade 9) would be involved in receiving, stocking, shipping, terminal operation, and delivery, as well as other activities of the store. Based on discussions with the Chief of the Reproduction and Distribution Bureau, it is estimated that delivery of small office supplies should take between four and eight hours per week. Large paper deliveries, i.e., continuous computer paper and fine paper deliveries will take about the same amount of time.

In addition to direct staffing, a bureau chief (Grade 17) should devote approximately one quarter time to supervision of the operation. Expertise at this level is required to assimilate all the factors which impact the central stores operation and to apply them in such a way as to keep the stores operating in an optimal fashion. In broader terms, the bureau chief is charged with management decisions necessary to keep the stores operating with maximum economic efficiency. The budget allows $2,800 per year for contracted services. This allows the bureau chief to enlist 4 man-weeks of aid in areas of expertise outside of his training and experience, i.e., systems analysts and operations analysts. The following table summarizes the estimated positions needed to operate the stores and estimates their costs:

Table 5 - CENTRAL STORES PERSONAL SERVICES

FTE	Position	Grade	Salary
.25	Bureau Chief	17	$ 6,200*
1.00	Supervisor	12	16,000*
2.00	Clerks	9	25,000*
	Contracted Services		2,800
	TOTAL		$50,000

*Calculated at Step 4 and includes employee benefits.

WAREHOUSING

The following table lists the required warehouse area for each category within the central stores. This figure represents an ideal open warehouse. If a warehouse with an "awkward" layout (i.e. the pillars in the Old Liquor Warehouse) is used, then more area will be needed. The area required for small office supplies is based on inventory levels as determined by economic order quantity (E.O.Q) calculations. Fine paper and computer paper area requirements were based on the space used to store the present inventory levels. Receiving and shipping estimates came from discussions with store personnel.

Table 6 - SIZE OF CENTRAL STORES
(ft^2 of floor space)

CATEGORY	AREA FT^2
Small Office Supplies	2,000
Fine Paper	2,500
Computer Paper	2,500
Receiving and Shipping	2,500
Office, Lavatory, etc.	500
TOTAL	10,000

The cost of the warehouse was estimated two different ways and the results compared. The first was leasing warehouse space from private owners and the second was using existing State warehouse facilities. Presently the State rents warehouse space from private interests for an average of about \$2.00 per ft^2 per year. Utilities add about \$.50/ft^2/year and services add about \$.50/ft^2/year. This means the 10,000 ft^2 will run \$3.00/ft^2/year or about \$30,000 annually. Another option, if available, is to use an existing State warehousing facility (such as a portion of the Old Liquor Warehouse). The space was being billed out by the General Services Division of the Department of Administration at \$2.13 per ft^2 last year. This included utilities, maintenance, and all services. However, pillars in the Old Liquor Warehouse cause a less efficient arrangement of the inventory. After examining it, and reviewing the blueprints, the stores appears to need about 14,000 ft^2 of the top floor. The cost as billed by the

General Services Division would be $29,820 - about the same as an average priced leased warehouse.

If an existing facility is used without depriving another agency of its space, then marginal cost will not be equal to the accounting cost. The marginal cost is the appropriate value for the feasibility question[4]. For example, if 14,000 ft^2 of the Old Liquor Warehouse were available and used, and no agency function was deprived of that necessary area then a marginal cost of zero would be appropriate in the analysis, even though the operation would be charged around $2.13 per ft^2 per year.

Remodeling a warehouse to serve the central stores is another cost of the warehouse. Shelving and other work is estimated at $10,000. Amortized over the next five years at 10.5% this becomes $2,672 per year. The total annual cost is about $33,000 ($30,000 warehouse + $3,000 remodeling).

CARRYING COSTS

Given the dollar value of the average inventory, the carrying cost is either the price of borrowing the money for the inventory, or the yield that would have been made by investing the money spent on the inventory (i.e. the opportunity cost of the inventory's value). Assuming the money for the inventory would come from the general fund, the carrying cost of the inventory is the interest which would have been earned on the additional money had it been invested instead of spent on inventory. The appropriate interest rate for use in the analysis is the "expected" or "typical" yield on an additional $294,000 (see Table 7) in the fund. The FY 1979 yield was 8.5% on the general fund. However, for this analysis 2% was added (for a yield of 10.5%) to account for the higher short-term rates experienced in FY 1980.

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[4] For an explanation of the appropriateness of marginal cost see: Heyne, Paul T., The Economic Way of Thinking, (Science Research Assoicates Inc., 1973) Chapter 5 and 6.

The values in Table 7 are derived from several sources. The annual dollar values (A.D.V.) are calculated in the background section of the report. The average inventory (A.I.V.) value is calculated as follows:

$$\text{A.I.V.} = \frac{\text{A.D.V.}}{\text{Average orders/year} \times 2} + \frac{\text{Months of Safety Stock} \times \text{A.D.V.}}{12}$$

Table 7 - AVERAGE ANNUAL INVENTORY OF THE PROPOSED STORES

Category	Annual $ Value	Average Orders/Year	Safety Stock	Average Inventory Value
Small Office Supplies	$399,000	3	2 mo.	$133,000
Computer Paper	140,000	1	3 mo.	105,000
Fine Paper	74,000	2	6 mo.	56,000
TOTAL	$613,000			$294,000

Based on the above discussions and table the annual carrying cost of the inventory is about $30,900 ($294,000 X 10.5%).

INVENTORY CONTROL SYSTEM

The design of an optimal central stores includes an automated inventory control system. With an automated system demand and supply forecasts, economic order quantity formulas, etc., can be integrated into the inventory system. This will help the stores to operate near its optimum levels. With a manual system for an inventory of a thousand items, optimal efficiency could only be reached by accident or with a full-time technician doing the calculations. The Department of Institutions has a software package inventory control system which appears to be adaptable for the central stores. Table 8 breaks down the estimated costs to adapt Institutions inventory control system and then operate that system.

Table 8 - COST BREAKDOWN - INVENTORY CONTROL SYSTEM

ITEM	ANNUAL COST	INITIAL/ONE TIME COSTS
Software		
Development and Maintenance	$2,800	$8,400
Data Capture*		900
Hardware		
C.R.T. w/control unit	2,300	50
Printer	1,800	50
Misc. Paper & Equipment	200	200
Computer Time	1,000	100
Labor	---	200
Total	$8,100	$9,900

*This will be an ongoing function of the stores staff.

Amortizing the initial costs over a five year period at 10.5% adds $2,645 to the annual cost of $8,100 for a total of about $10,700.

PURCHASING

The Purchasing Division will continue this function under a central stores. However, their time and expense will decrease drastically. For example, 600 small office supply items are now bid quarterly. It takes the Division a month to tabulate orders and call for bids, as well as a month in the compilation of bids. Then, a purchase order is made up for every vendor each agency buys from, and this takes another month. This year over 1100 purchase orders for small office supplies will be processed. Over twice that many would be used if the Department of Revenue pilot stores was not operating. It is estimated that each additional purchase order costs on average about $9.46[5] to process. Each

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[5] Estimated from data provided by the Purchasing Division.

additional item on an order is estimated to cost $.77. Thus, every time an item is added to an existing purchase order instead of processing an additional one it saves an estimated $8.69. Under a central stores, excess purchase orders are cut only for those agencies which do not use the central stores. Except for these agencies only one purchase order per vendor, per call, is needed. A comparison of purchasing costs of a central stores versus the present system is formalized in the following table. The purchasing costs of paper products is less due to the smaller number of items and number of purchase orders.

Table 9 - COMPARISON OF ESTIMATED ANNUAL PURCHASING COSTS

CATEGORY	PRESENT	PROPOSED STORE	NET SAVINGS
Small Office Supplies	$12,600	$1,900	$10,700
Computer Paper	200	200	-0-
Fine Paper	900	700	200
Total	$13,700	$2,800	$10,900

DISTRIBUTION

During the review of the present system it appeared that daily delivery was an unnecessary service which did not serve the best interests of the State. Most agencies already have storage areas for at least a week's supply. On those (hopefully) rare occasions when an agency runs out of an item, the deadhead daily service can provide daily distribution. Therefore, the proposed central stores was designed with a weekly order and delivery system with deadhead acting as a backup. The delivery van will cost $975.00 per year (based on December 1979 Motor Pool rates) with the deadhead service running about $600.00 annually. The delivery person's wages are accounted for under the salary heading. Thus the total annual distribution costs are estimated at $1,600.

CENTRAL STORES BUDGET

Each of the preceding subsections analyzes a portion of the annual budget of the proposed central stores. This budget is designed to represent a typical year of operation. Implicit in the choice of this type of budget, as compared to a present value (discounted value of the future stream of costs) approach, is the assumption of a proportional relationship between the discount rate and the rate of cost increase. The rational for using this approach is twofold. First, fixed costs (start-up expenses) are a relatively small proportion of cost and are amortized out over five years. Second, forecasts of price increases in each area of operations have high variances, and thus low confidence levels. Combining this point with the debate over the proper discount rate on public projects only increases the variation of possible cost estimates from a present value type estimate. Thus, any attempt to use this type of analysis could not be justified from a cost standpoint, i.e., why spend more money on the study if it won't increase its accuracy?

The costs of operating a central stores can be examined from an economic or an accounting perspective. The accounting costs are the direct costs of operation which are assigned to the stores. They are summarized as follows:

Table 10 - ANNUAL ACCOUNTING COSTS OF A CENTRAL STORES

Salaries	$50,000
Warehousing	33,000
Inventory Control System	10,700
Distribution	1,600
Total	$95,300

The annual cost of the items to be sold by the State stores is estimated at $613,000 (see Table 7). Thus, the operational costs are estimated at 16% ($95,300 ÷ $613,000) of the cost of the merchandise. In other words, a markup of 16% on all items will cover the operational cost of the stores if these costs are paid out of the profits.

Economic costs include all costs attributable to the operation. In some analysis these would include internal and external costs. For this feasibility question only the internal costs are being estimated. Externalities as well as indirect and macro costs are beyond the scope of the study. The economic costs which were within the scope are listed below:

Table 11 - ANNUAL ECONOMIC COSTS OF A CENTRAL STORES

Salaries	$50,000
Warehousing	33,000*
Carrying Cost	30,900
Inventory Control System	10,700
Purchasing	2,800
Distribution	1,600
Total	$129,000

*If an existing State building (Old Liquor Warehouse) is used, the economic cost will only be the remodeling cost $3,000. The total cost would then be $99,000.

SENSITIVITY ANALYSIS

To this point some budgets for a central stores have been constructed. However, these figures are based on estimates of annual volume -- estimates which (as stated earlier) may be somewhat inaccurate. Thus, the reason for sensitivity analysis. It will give an indication of how the budgets will change if the volume is greater (or less) than the estimates. As before, each cost area is discussed separately.

Before proceeding it is important to understand some of the limitations of this sensitivity analysis. Most of the cost areas do not increase smoothly as volume increases (or decreases). For example, additional labor is usually added in increments such as 0.50 FTE. Generally small fluctuation in volume will not trigger any change in staffing. The same situation exists with warehousing. When 100 ft^2 of additional space is needed it generally cannot be added. The warehouse manager makes do with what he has. While actual cost areas step from

plateau to plateau the sensitivity analysis assumes a smooth transition. Therefore, the results indicate direction and relative rate of change only; the absolute values may not be accurate. For the analysis a 10% change was assumed only as a tool from which the direction and relative sizes could be determined.

Salaries

An increase (decrease) in the stores volume will cause the warehouse staffing requirements to increase (decrease) in a fairly proportional relationship. However, the management costs will remain quite constant as their time deals more with problems not directly affected by per item volume. The final result of a 10% change in volume will be a 10% change in the warehouse staff which is an 8% change in total salary costs.

Warehousing

Storage area will be affected by a change in volume but not the receiving, shipping and office areas. The 7000 ft^2 which is affected by a change in volume is affected by a power function of 0.5 and not proportionally[6]. That is, as the volume of office products increases, the order size (and thus, storage area needed) increases by the square root of the volume increase.

For example, suppose the actual volume of office supplies used by the State is 10% greater than the estimate. Thus, the true volume is 1.1 times the volume of that estimate. Since a power function of 0.5 is the same as taking the square root, the square root of 1.1 is taken:

$$\sqrt{1.1} = 1.049$$

Therefore, the size of each order will be 1.049 times as big as the original estimate. This is equivalent to an increase of 4.9% which is rounded off to 5%. The conculsion is: a 10% higher level of volume will require a 5% larger order

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[6] Levin, Richards I. and Charles A. Kirkpatrick, Quantitative Approaches to Management (McGraw Hill: 1975) Pg. 184-185.

size. Assuming 5% more storage space for the 5% larger orders, the storage area is increased by 350 ft (7,000 ft^2 X 5%). The increased cost is $1,050 (350 ft^2 X $3.00/$ft^2$/year).

Carrying Costs

Carrying costs are affected similarly to storage area costs since the optimum average inventory is increased at a rate equal to the square root of the volume increase (assuming everything else stays constant). The result of a 10% increase in volume is about a 5% increase in average inventory which translates a 5% increase in carrying costs. The total increase is $1,550 (30,900 X 5%).

Inventory Control System

The inventory control system is primarily a fixed annual cost with little or no change in cost as the per item volume increases.

Purchasing

The orders per year in an optimum inventory management model increase by a power of 0.5 of the increase in volume in a similar manner as order size increased above. So, a 10% change in volume causes an increase in purchasing cost of about 5% for a total of about $140 ($2,800 X 5%).

Distribution

Distribution costs will change with volume but not smoothly. It is more a trigger type change; once the van is filled to capacity any further increase in volume requires another trip. However, since on the average the volume and distribution costs will vary proportionally, and since they are the smallest of the cost areas, the costs are assumed to increase at the same rate as volume. A 10% increase in volume increases distribution costs by 10% for a total of about $160 ($1,600 X 10%).

Conclusion

The following table summarizes the result of a 10% change in volume on each of the cost areas. Since the budget total is $129,000, a 10% change would be $12,900. However, the budget only changed by $7,000 which is a 5.4% change. This implies that as volume increases, the cost of supplying that volume also increases but at a lower rate. In other words, if the estimate of volume is low, then the economic cost of the stores will be a slightly smaller proportion of the total annual supply costs than estimated. The inverse is also true. If the annual dollar volume is overestimated, the economic cost of the stores will be a larger proportion of volume.

Table 12 - SENSITIVITY ANALYSIS OF ECONOMIC COSTS

Cost Area	Budget	Budget Change Due to a 10% Volume Change
Salaries	$50,000	$4,100
Warehousing	33,000	1,050
Carrying Costs	30,900	1,550
Inventory Control System	10,700	0
Purchasing	2,800	140
Distribution	1,600	160
Total	$129,000	$7,000

PARTIAL BUDGET: CENTRAL STORES vs TERM CONTRACTS

The purpose of this partial budgeting is to provide a format to examine the monetary effects which occur when modifying or changing an enterprise. The proposed central stores is compared here as a change from term contracts (similar to the old office supply contract). Those estimates not explicitly derived below are obtained from the previous sections of this report.

To maintain consistency within the report, the cost areas in this section are in the same order as they are in the previous section.

SALARIES

User agency labor, involved in small office supplies, is similar in both term contracts and a central stores since both sources of supplies will provide similar services. The difference in labor requirements is first apparent with the labor needs of the central stores -- $50,000 per year. This is offset somewhat by labor now used in the Department of Revenue's pilot store. If the operation were only serving the Department of Revenue, the volume would be halved. The Department of Highways uses 0.50 FTE for an even greater annual volume. Therefore, it is reasonable to conclude that the labor would change from 2.50 FTE serving the pilot store to 1.00 FTE serving the Department of Revenue office supply function only. This is a change of 1.5 FTE at $12,500/FTE for a total of about $18,800. The total net increase in salary expense is $31,200 ($50,000 - $18,800).

WAREHOUSING

Even though the old term contract specified weekly delivery, small office supply orders were plagued by back orders. The term contract used in this analysis assumes continuation of the present standardized office supply list. This should alleviate some of the back order problem with the term contract. Since both the term contract and the central stores have weekly delivery on small office supplies, this analysis assumes that most user agencies will store the same amounts of small office supplies under either situation. One exception

is the Department of Revenue stores. It is assumed that the Revenue stores will continue in a substantially reduced capacity serving only the Department of Revenue. A decrease in their volume by ½ will decrease the need for storage space for small office supplies. However, since the Department of Revenue rents their warehouse area as a unit, it is doubtful that any savings can be directly realized.

Past experience has shown that agencies store larger quantities than is optimal under a weekly delivery situation. One possible reason is lack of confidence in receiving orders promptly. Another reason is the high cost of an out of stock condition. That is, if an agency runs out of an item, they must send an employee to a local vendor to purchase it. This is a relatively expensive option. If the proposed central stores is managed as it is designed to in this analysis, agencies should receive orders weekly, bringing about confidence in the system. The proposed central stores also has the ability to deliver items the same day they are ordered, to cover possible emergency situations. This combination could result in lower inventories being carried by agencies and departments in Helena. If the central stores is managed as designed, the additional cost of warehousing space should be somewhat offset by opening up warehousing space within agencies for other uses.

If term contracts existed for both fine paper and computer paper, shortage would still be available in response to the variable nature of fine paper supplies and the high cost of running out of computer paper. Presently, fine paper and computer paper are stored in about 10,300 ft^2 of the Old Liquor Warehouse at \$2.13 per ft^2 for a total annual cost of \$21,939. However, some items in both the fine paper and continuous computer paper categories are not stored in these areas and instead are stored in agencies throughout Helena. In an effort to account for this storage, 5% was added to the above figure for a total of approximately \$23,000. Subtracting this from the \$33,000 annual estimated warehousing cost of a central stores leaves an additional cost of \$10,000.

CARRYING COSTS

If an agency received the same service from a central stores as from a term contract, they would probably maintain the same inventory levels. However, the central stores proposed in this report was designed to cause inventory levels to decrease. By having a mechanism for daily delivery on items an agency inadvertently runs out of, the central stores reduces the need for agencies to individually store excess levels of individual items. Unfortunately, this doesn't guarantee reduced inventories within the agencies, especially when those agencies have very little incentive not to overstock. Hopefully, if a central stores were established, excess inventories within State agencies would be reduced. Once over stock conditions are identified, less wasteful stocking practices can be adopted. Nonetheless, at this point it is difficult to estimate the level of overstock which exists within State agencies. Thus, for this study the conservative approach has been taken by assuming the worst -- that agencies will continue to stock equal levels of inventory under either term contracts or a central stores.

The exception to this is the Department of Revenue's store which now carries a $60,000 inventory. Since the central stores will serve all Helena agencies and will carry the safety stock for them the inventory should be reduced by at least 50% -- to $30,000. It is expected that other agencies will reduce their inventory and thus carrying cost (i.e. the Department of Highways has annual volume similar to the Department of Revenue but their average inventory of office supplies is $110,000). In any case, agencies cannot be forced to operate within optimal inventory levels so again the worst has been assumed. This means the additional inventory level of the stores will have a carrying cost of $27,700 [($294,000 - $30,000) X 10.5%].

INVENTORY CONTROL SYSTEM

Under a term contract none of the initial, and most of the ongoing costs, of a computer operated inventory control system will not be incurred. Thus, the increase in cost is equal to the annual cost of the central stores inventory control system or approximately $10,700.

PURCHASING

Purchasing expenses are estimated to be the same under either an annual term contract or a central stores.

DISTRIBUTION

The entire cost of distribution under a central stores is an added cost over a term contract. Some agencies use personnel and trucks in shipping paper and other office supplies, but these savings cannot realistically be transferred to a central stores. Thus, the additonal distribution costs are estimated to be $1,600 per year.

PRICE SAVINGS

Price savings occur when the office supply items are purchased at a lower price. In this case, the central stores uses a list of items and buys these items at the low bid price. In total, the prices are less than term contracts have historically been. The annual savings for office supplies, which is derived on page 4, is $152,000. The annual savings on computer paper is $36,100 (page 8). The savings from fine paper is not known. However, the bid versus term contract savings, as a percent of the term contract price, was 27.6% for small office supplies and 25.7% for computer paper. Assuming the average of these two discounts (26.65%) holds for fine paper and since our estimate of annual purchases of fine paper is $73,000, the savings per year is $26,500 [($73,000) ÷ (1 - .2665) - $73,000 = $26,522.84]. The total price savings from these categories is $214,600 ($152,000 + $36,100 + $26,500).

Another savings which could occur is the result of a single delivery point compared to multipoint delivery under the bids from which the estimates were obtained. Vendors indicated to Purchasing Division personnel that 10% had been added to cover the cost of multiple drop points throughout the State. Since a central stores operation will result in only one drop point for Helena-based State agencies, (but other drop points around the State for small amounts of office supplies may continue) delivery costs for the vendor will decrease. It

is assumed this decrease will be about 5% of the bid prices. This amounts to \$20,000 (399,000 X .05 = \$19,950).

SUMMARY

Table 13 summarizes the partial budget comparison for a central stores operation versus a term contract. While the estimates may be off somewhat and affect the magnitude of the decision, there is no question as to the direction of that decision. The results of a partial budget aimed at an analysis of a supply operation switching from term contracts to a central stores operation clearly indicate a monetary savings of over \$150,000 annually. The analysis is static, and only examines one year of operation. However, as explained earlier, this is sufficient for the study. In addition, many non-quantifiable savings were noted in the narrative. These strengthen the results that a central stores is a more economically efficient method of obtaining and distributing office products.

Table 13 - A PARTIAL BUDGET COMPARISON: A CENTRAL STORES vs A TERM CONTRACT

Increased Costs (Additional Expenses)		
Salaries	$31,200	
Warehousing	10,000	
Carrying Costs	27,700	
Inventory Control System	10,700	
Distribution	1,600	
		$84,200
Decreased Costs		
Price Savings		
Small Office Supplies	$152,000	
Computer Paper	36,100	
Fine Paper	26,500	
Single Drop Point	20,000	
		$234,600
Net Savings		$150,400

On page 21 sensitivity analysis was discussed. It indicates that the costs of operating the stores increases at a rate less than the rate at which the volume increases. This relates directly to the "increased cost" section of the partial budget since this category is composed of the additional (or increased) cost of doing business through the central stores. The "decreased cost" category behaves in a different manner as volume increases. Throughout the study, the larger the quantity agencies purchased, the lower the price. This means that as volume increases the total price savings increases at a greater rate than volume.

The results of the sensitivity analysis on the partial budget points to the following conclusions:

- If the estimates of volume are accurate, the central stores is an significantly less costly method of obtaining office products than a term contract.

- If the estimates of volume are low and the true volume is greater than estimated, then the central stores is even more advantageous than a term contract.

- If the estimates of volume are high and the actual volume is less than estimated, then the relative advantage of the central stores decreases. However, over all conceivable ranges of volume, the central stores will remain advantageous.

PARTIAL BUDGET COMPARISON: CENTRAL STORES vs PRESENT SYSTEM

The present purchasing system consists of quarterly buys for small office supplies, semi-annual calls for fine paper, and a term contract for computer paper. The storage system includes a pilot store for small office supplies serving some agencies and storage areas in most departments and large divisions. Some departments have only small central storerooms and generally store their supplies throughout their offices. A major portion of duplicating paper is stored by the Reproduction and Distribution Bureau. Computer paper is stored by the Computer Services Division.

NON-MONETARY COSTS

Besides the type of data required for the previous partial budgets, some very important, non-quantifiable factors enter into the comparison between the proposed central stores and the present system. Most of these factors involve small office supplies.

One of these factors is the labor requirements at the agency level of the quarterly call. Thirteen of the larger divisions and departments were contacted to obtain a sample of the effort required by each to order their supplies and manage their inventories. Generally, the quarterly call forced agencies to spend time in forcasting and ordering office supplies when they had other jobs to do. The survey indicated that these office supply oriented tasks were extremely time consuming in the agencies view. In addition, the agencies generally believed they predicted their supply needs for the upcoming year poorly.

The quarterly call placed such a heavy burden on the agencies that they reacted in various ways to remove that burden. Many began using the pilot store operated by the Department of Revenue. While the recent surcharge caused a lot of complaints, and technically raised prices by 20 to 30%, very few agencies have stopped using the store. This indicates that the pilot store, even with its increased prices, is still preferred over the quarterly call by most agencies. Other agencies ordered heavily the first two quarters so they wouldn't have to order the last two quarters of the year.

Obviously, the non-quantifiable costs, i.e., the non-measurable problems, are quite significant, and should be recognized in any analysis of the quarterly call. The Purchasing Division supported this view. After numerous agency complaints, the Purchasing Division concluded that a term contract or a central stores are the only viable options. In fact, the Purchasing Agent for small office supplies plans on letting a term contract beginning with the 1981 fiscal year, unless a Central Stores is established by then.

The question is, how can these non-monetary values be included in the partial budget comparison? First, a problem exists only if the central stores does not save any money over the present system. If it breaks even or saves a little, then with the non-monetary savings it is extremely favorable. Even if it looses a little (the net savings are less than zero), then the benefits will outweigh the costs. The problem occurs when the net savings is well below zero and it is not known if the non-monetary savings is great enough to offset it.

SALARIES

The proposed central stores has an annual salary budget of $50,000. If it were operational, the Department of Revenue's store could operate with one FTE at an annual savings of $18,800 (see page 25).

Other employee time would also be saved. As reported in the last section, there is a large amount of employee time used by the agencies to run the quarterly call. In one sense this is a savings, but in another sense, the State as a whole does not realize a monetary savings. Therefore, the net monetary change in salary expenditure is an additional cost of $31,200 ($50,000 - $18,800).

WAREHOUSING

Duplication paper and continuous computer paper are stored in 10,300 ft^2 of the Old Liquor Warehouse at $2.13/$ft^2$/year for a total annual cost of about $21,900. The total decreased warehousing cost is the $21,900, but the central stores will add $33,000. Savings should occur at the agency level through decreased storage but these are non-monetary gains and cannot be measured here. The net increase in cost is therefore: $33,000 - $21,900 = $11,100.

CARRYING COSTS

To estimate the change in carrying costs it is necessary to know the change in average inventory. Under the current conglomerate system all agencies have some storage. A few of the known inventory levels are:

Reproduction and Distribution Bureau	$90,000
Computer Services Division	81,000
Department of Revenue Stores	60,000
Department of Highway Stores	110,000
	$341,000

The agencies not listed could easily double this level bringing it to the neighborhood of $700,000. The proposed central stores will have an average inventory of just under $300,000, but agencies will still retain some storage. In net, it can quite safely be assumed that average inventory will not increase with a central stores. Therefore, the carrying cost won't increase either.

In summary, the conservative approach is taken since the data is not available. The study assumes no change in carrying costs with the installation of a central stores.

INVENTORY CONTROL SYSTEM

The inventory control system is an additional cost associated only with the central stores. This is a total of $10,700 annually.

PURCHASING

Purchasing expenses will decrease dramatically under the new system for small office supplies. The major reason for this is the decreased number of purchase orders (see page 19). As derived in Table 9, the net decrease in purchasing cost is $10,900. While it may be argued that this dollar savings cannot be realized, it is noted that most of this savings is labor. Reorganization of the staff involved should result in freeing a large portion of one person's time and making the savings possible.

DISTRIBUTION

Currently, the Department of Revenue's pilot store is charged $100 per month for an annual charge of $1,200 by the Reproduction and Distribution Bureau for distribution. Since the annual distribution charges under the optimal stores is estimated at $1,600, the net increase is $400 per year.

PRICE SAVINGS

Under the current system and the proposed stores, both small office supplies and fine paper will be purchased by the same method in approximately the same quantities. Very little price difference should occur. Computer paper is now purchased on a term contract and the savings (as noted) will run about $36,100 annually.

Another price savings is expected to occur due to the single drop point. This is the same as estimated in the last section -- about $20,000.

SUMMARY

A summary of the information discussed above is presented in Table 14. Compared to the present system, a central stores is estimated to save $13,600 annually. If the non-monetary savings could be included, the difference would be even greater.

Table 14 - A PARTIAL BUDGET COMPARISON: A CENTRAL STORES vs THE PRESENT SYSTEM

Increased Costs (Additional Expenses)		
Salaries	$31,200	
Warehousing	11,100	
Inventory Control System	10,700	
Distribution	400	
		$53,200
Decreased Costs		
Computer Paper	$36,100	
Single Drop Point Price Savings	20,000	
Purchasing	10,900	
		$67,600
Non-Monetary Savings		SIGNIFICANT
Net Savings from Central Stores		$13,600+

*all values rounded to the nearest $100.

A review of the partial budget comparison with respect to its sensitivity reveals a pattern similar to the partial budget comparison of the previous section. However, the lower magnitudes and the move of purchasing from increased cost to decreased costs tends to decrease the sensitivity. Therefore, our net savings estimate is generally proportional to the total value. The estimate of net savings will increase slightly faster than any increase in the volume of supplies. If the estimate of annual usage is high, the net savings will be reduced by an amount slightly more than proportional to the decrease in annual consumption.

CONCLUSION

The results are striking. According to the analysis, the central stores will save over $150,000 annually over a term contract system and $13,800 + non-monetary savings over the present conglomerate system. These results are summarized in Table 14. The Central Stores is consistently rated the highest in each category. Thus, the study recommends a central stores serving State agencies. The stores would carry small office supplies and paper products under a weekly delivery system.

Table 15 - SYSTEM COMPARISONS

System	Service	Agency Workload	Cost
Term Contracts	Good	Low	High
Conglomerate System	Poor	High	Low-Med
Central Stores	Good	Low	Low

While the study recommends a central stores, it leaves out one variable: management. The savings under the study assumes a high level of management capability at the bureau chief and consulting levels. If that management assumption is violated, the results of the study lose some of their validity.

DEPARTMENT OF ADMINISTRATION
INFORMATION SYSTEMS DIVISION

I.S.D. STANDARD PRACTICES
PHASES APPROVAL

ase number (Completed) 99-808* 300	Phase Title PROJECT REPORT	Date 01-29-80
System Name FEASIBILITY OF CENTRALIZED STORES	Project Leader Name JOHN SNYDER	

- Signatures below approve all work accomplished for the above system.
- When checked in the lefthand column, (✓) signatures are required by I.S.D./User Managers before work can progress to the next phase.

Signature Required	Manager's Title	Signature	Date
☒	Director, Department of Administration	David M Lewis	1-31-80
☒	Administrator, ISD		1-29-80
☒	Chief, Consulting Services Bureau	Rod Sager	1-29-80
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WHEN ALL SIGNATURES ARE COMPLETED, RETURN TO:
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